

Work Plan for Emergency Pond Water Treatment Leviathan Mine

Background

Leviathan Mine (the Site) is an abandoned sulfur mine that the State of California acquired in 1984 in order to pursue cleanup and abatement of water quality problems caused by historic mining. Jurisdiction over the Site rests with the State Water Resources Control Board, which has delegated jurisdiction over cleanup activities to the California Regional Water Quality Control Board, Lahontan Region (Regional Board). The location of the mine is in Alpine County, California, approximately six miles east of Markleeville, California.

Historic mining activities at Leviathan Mine included underground and open pit extraction of sulfur. These activities resulted in the exposure of pyrite, contained in the native soil and rock, to air and water. Exposure of pyrite to air and water causes the generation of acidic drainage, also referred to as acid mine drainage (AMD). As AMD travels through the ground, it dissolves and carries metals contained in the native soil and rock.

In 1985, on the State's behalf the Regional Board completed construction of a pollution abatement system at Leviathan Mine to address specific problem areas. The 1985 project included construction of five lined evaporation ponds to capture and evaporate AMD. The primary sources of AMD to the ponds are the Adit and the Pit Under-Drain (PUD).

Given the limited usable area at the mine site, the evaporation ponds could not be sized to provide 100 percent containment of influent flows (consisting of AMD from the Adit and PUD, and direct rain/snow onto the ponds); consequently, the ponds periodically overflowed and discharged to Leviathan Creek.

In order to prevent pond overflows, the Regional Board through its contractors, developed and implemented a process to treat and discharge pond water during the summer months, as a means to increase pond holding capacity for the subsequent winter and spring months. The Regional Board implemented a treatment system during the 1999 field season and ponds have not overflowed since 1999.

During the 2004 field season, the Regional Board was successful in treating nearly all of the AMD contained in the pond system; however, above average precipitation during the 04-05 water year has caused the ponds to fill to near capacity. The rate of flow from the Adit and PUD into the pond system is more than double the highest flow rates recorded since 1998. In addition, the volume of direct rain/snowfall is the highest recorded in several years. Weather conditions have not resulted in significant losses due to evaporation that would normally prevent an overflow of the pond system in late spring. Regional Board staff estimate that overflow of the pond system will occur in late-May 2005 (this estimate assumes no additional direct precipitation and no evaporation).

If left unabated, AMD having an approximate pH of 2.8 and elevated concentrations of metals and metalloids (including: iron, aluminum, arsenic, copper, and nickel) will overflow the pond system and enter Leviathan Creek. Approximately two miles downstream from the mine site, Leviathan Creek enters Bryant Creek. Approximately seven miles downstream from the

confluence of Leviathan and Bryant creeks, Bryant Creek enters the East Fork of the Carson River in the State of Nevada.

Description of Treatment Process

To prevent the discharge of untreated AMD from the pond system, Regional Board staff propose to secure a contract wherein a contractor will setup and operate an emergency system to introduce lime into Pond 3. The lime will provide a source of alkalinity to the AMD in Pond 3 and will raise the pH. As the pH increases, dissolved metals in the AMD will precipitate into a solid form. It is anticipated that the treated AMD will be of much higher quality with a circum-neutral pH and significantly lower dissolved metal concentrations. If it appears that overflow of upper ponds (1, 2N, and 2S) is inevitable, treated AMD will then be discharged from Pond 3 to Leviathan Creek to create capacity in Pond 3. Once treated AMD has been evacuated from Pond 3, there will be capacity to contain overflow from the upper ponds. As Pond 3 refills with AMD from the upper ponds, additional lime will be introduced to increase pH. If it appears that additional capacity is needed, treated AMD in Pond 3 will again be discharged to Leviathan Creek. This process will continue for up to four weeks (see Operations, below), or until additional capacity is not needed.

Project Tasks

Health & Safety Plan: The project tasks will commence with development of a Health & Safety Plan for the project. The Contractor will be permitted to amend the existing Health & Safety Plan for operation of the biphasic pond water treatment system. This task will include a job walk by the Contractor's Health & Safety Coordinator, preparation of an addendum to the biphasic Health & Safety Plan, and coordination during project setup.

Mobilization/Demobilization: It is assumed that it will take one 8-hour day to mobilize to the site, setup, receive equipment, etc. It is assumed that it will take one 8-hour day to demobilize from the site. Mobilization/Demobilization includes delivery/pickup of all necessary power supply, pumps, plumbing supplies, labor support facilities (including portable toilet, washstand, and all necessary personal protective equipment), and labor to perform the task.

Operations: It is assumed that operation of the necessary equipment will occur for a period of 4 weeks, 5 days per week, 10 hours per day. This task includes providing all necessary consumables (including lime, fuel, oil, gas, etc.), equipment (generator, pumps, etc.), labor support facilities (including portable toilet, washstand, and all necessary personal protective equipment), and labor for the duration of the Operations task.

Estimated costs for completion of the above-tasks are provided in attached spreadsheet.

Schedule

In order to prevent the discharge of untreated pond water, the Regional Board will commence emergency pond water treatment as soon as possible. The Regional Board will provide emergency treatment of pond water as summarized in Table 1, below.

Table 1. Schedule of Completion Dates

Description	Anticipated Completion Date
Complete Health & Safety Plan	May 24, 2005
System mobilization and assembly	May 23 to May 27, 2005
Pond Water Treatment	May 31 to June 22, 2005
System demobilization	June 23, 2005